BRITISH COLUMBIA

Ministry of Forests

Guidelines for Conducting Field Scales

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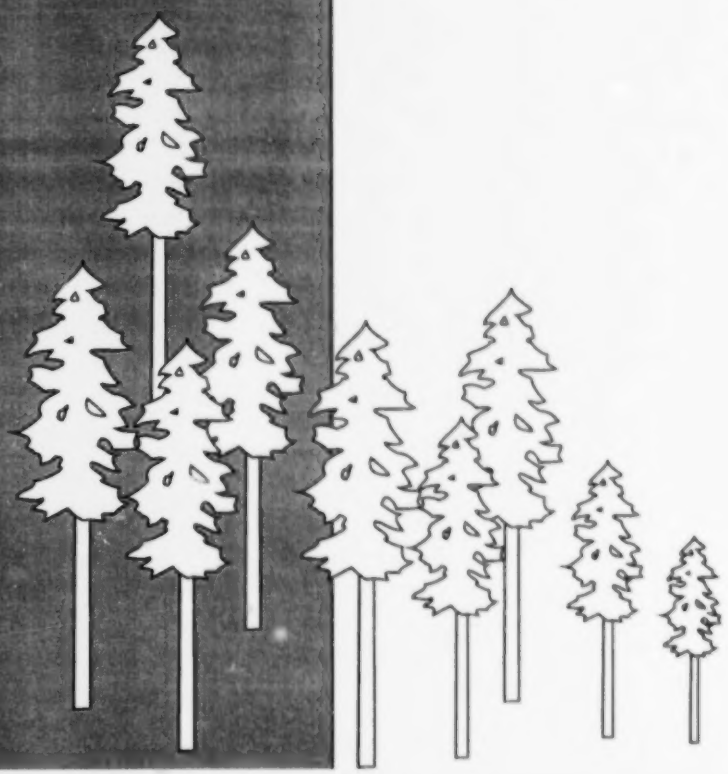

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FIELD SCALE METHODS

Purpose

The *Scaling Regulation* provides that a field scale may be done where timber has not been scaled as soon as possible. These guidelines were prepared to assist in estimating the volume and grade of timber in the form of decks or other accumulations where a field scale is to be done under Section 3(1) of the *Scaling Regulation*.

General Requirements for a Field Scale

Conditions essential to the success of the field scale include the following considerations:

- To ensure the correct timber mark for all timber, the logs must be marked well enough to maintain segregation by mark when eventually delivered to a scale.
- To account for inventory and movement, all deck locations should be documented. Attach information such as maps & photos to the plan showing deck locations and other relevant information to the plan, for the use of field scale staff.
- To enable most methods of field scaling, some means of access for field scale staff is required.
- Under Section 94 (1) and (2) of the *Forest Act*, only licensed scalers may perform a scale. (Ministry scalers will normally only scale abandoned decks.)
- To avoid variables caused by deterioration in storage, decks must be moved as quickly as possible to scaling facilities.
- In the event that transport of residual volumes (e.g. cleanup) is delayed, a contingency plan should be in place for scaling these volumes.
- The commencement, progress, and completion of deliveries for each decking location must be coordinated with the Forest Service District office.
- The plan must include accountability for lost or destroyed timber, by providing an avenue for the field scale to replace all, or part of the official scale, if an official scale becomes impossible.
- Section 99 of the *Forest Act* provides for dispute resolution in the event of an objection to any scale.

Preparing for the Survey

To ensure field scales are conducted at reasonable expense and with satisfactory results, an organized approach to preparing for and conducting the survey is required. In any event, persons conducting field scales must be accountable for their estimates, as the field scale may be the basis for a final stumpage billing. Documentation supporting field scale estimates (i.e., volumes by species and grade) is required for all field scales.

Appendix A contains a sample worksheet designed to track the different stages of a field scale with the general requirements in mind. The worksheet may range from simple to compound, depending on administrative and operational requirements.

Appendix B contains a rating work chart to help determine relative suitability of each method under various operating conditions. This serves as a guide to the novice preparing for a field scale and is *not intended to replace professional judgement*.

Just as there are several methods for doing a field scale, there are many more ways to serve the administrative and operational needs. While Appendices A and B may serve as a platform for getting organized, they should not preclude other means to achieve the same results. Therefore, it is prudent to repeat that in all cases, professional judgement must prevail.

Methods

The following methods are derived from different practices throughout the province. Many of them may be unsuitable or not applicable to a particular area and may be ignored as candidates. Local knowledge, conditions, and good judgement will determine which methods are best for any given situation.

CRUISE VOLUME BASED ESTIMATES

From Deck Observations (See Also Stacked Volume Estimates)

Cruise volumes can provide a means to establish a basis for estimates of deck volumes.

- Multiply the net volume (in m^3) per tree from the cruise summary by the number of pieces in a pile.

- This figure, for example, 0.75 m^3 per tree multiplied by the number of full length logs in a deck, (e.g. 125 trees) will give an estimate of the volume of 93.75 m^3 in that deck.

Pros:

- Efficient for smaller decks.
- Base data is provided from documented source.

Cons:

- Less efficient for large decks.
- Can only be used for tree length decks.

Tips:

From the cruise summary for a cutting permit or timber sale that you are looking at, you can get the average gross or net volume/tree by species or by conifers for both.

To take into account the *decay, waste, & breakage (dwb)* in the stand, use the net volume/tree instead of the gross volume/tree.

From Area Harvested

Using a Cruise Base Assessed Progress Report will provide the necessary data for volumes and values in decks. To account for volumes hauled and scaled prior to the field scale, the following worksheet is a suitable format. Volume scaled by timber mark is not recorded by block, so some prorating may be required.

CRUISE-BASE MEASUREMENT REPORT FOR FIELD SCALE

Licensee:			
Report Date:	Forest License:	Cutting Permit:	Cut Block:
Timber Mark:	Date of Measure:	Predominate species	

Total Block Size (ha):	
Amendment Changes (ha):	
Net Block Size (ha):	
Total Area Logged to Date (ha):	

Species	Grade	Vol/ha (m3) x	Area logged	= m3 harvested	- m3 scaled	= m3 decked
TOTALS						

STACKED VOLUME ESTIMATES

Chapter 8 of the *Scaling Manual* offers three methods for estimating volumes of tree length piles (see *Scaling Manual* for detailed procedures). The required level of confidence will influence the estimator's choice of method.

Sampling the Pile and Counting the Pieces

1. Select sample areas in each pile by estimating the level of detail required. For example, in a large deck, one may choose five separate sample areas that in total are estimated to represent 1 percent of the volume in the deck.

2. Scale and grade every piece in the sample area by first estimating an average length for the sample area. (***DO NOT*** climb on the decks to get lengths.) It is difficult to match tops to butts in a deck, but if an average length is established, the volume will always calculate the same regardless of the order in which tops and butts are measured and recorded.

3. Count the number of trees in the pile.

4. Apply the frequency of each class in the sample to the total count to determine the distribution of each class in the pile.

Pros:

- Efficient for large relatively uniform decks.
- Can provide reliable volumes by species and grade.
- Normal scaling techniques are used.

Cons:

- Complicated process for small decks.
- Requires a basic understanding of random sampling techniques unless sample data is available from other sources.
- Sampling can be difficult unless sample areas are well exposed.

> Tips:
>
> Piles tied to an existing, previously sampled, population may use the sample statistics from appropriate stratums in the population to substitute for sampling the decks.

Using Piece Counts and Average Piece Size

1. Similar to the sampling method above, count the number of pieces and multiply the result by an average piece volume.

Pros:

- Relatively fast.
- Established method commonly used with special forest products.

Cons:

- May not provide species grade combinations.
- Requires relative uniformity of lengths, diameters, species, & grade.

> Tips:
>
> Use the *Scaling Manual* volume chart to find volumes by piece for uniform logs.

Measuring the Pile and Applying a Factor

1. Measure the height of the pile at 2 m intervals to an accuracy of 0.1 m.
2. Find the average height of the pile by dividing the sum of the measurements by the number of measurements
3. Measure the length of the pile.
4. Determine the average width of the pile by taking as many tree length estimates as possible, and divide the sum of the lengths by the number of measurements. ***Do not*** *climb on the decks.*
5. Multiply the pile height by the pile width by the pile length to arrive at the enclosed volume of the pile.
6. Multiply the enclosed volume by a factor (from past data or from the *Scaling Manual*) to arrive at the estimated volume in the pile.

Pros:

- Works well for uniform piles.
- Established method commonly used with special forest products.
- Relatively fast.

Cons:

- Does not provide species grade combinations.
- Factors may have to be adjusted for voids.
- Accuracy declines as pile lengths increase.

Tips:

Measure pile heights down both sides of the pile.

Find average lengths from visual estimation of predominate lengths.

Bundle Counts in Bundled Decks

1. Similar to sampling above, count the number of bundles.
2. Determine an average volume (and species and grade if possible) per bundle.
3. Multiply the number of bundles by the average volume per bundle. If possible, use the average volume by species and grade per bundle.

Pros:

- Very fast and reliable.
- Has potential to provide detailed results by species and grade.

Cons:

- Restricted to bundles.
- Requires bundle uniformity or additional estimation of bundle makeup.

> Tips:
> Use existing scale records to determine average bundle content.

Ocular Estimates

1. Using experience, visualize a "truckload" of whatever size you are comfortable with, e.g., 38-40- or 55 m^3.
2. Walk the decks, counting the "truckloads."
3. The deck volume is the number of loads times the "truckload" volume.

Pros:

- Very fast and reliable in experienced hands.
- Can provide some results by species and grade.

Cons:

- Requires someone who has experienced large numbers of trucks being loaded, weighed, and scaled.

> Tip:
>
> Use sample data for species grade content.

Mechanical Methods

Tree Harvester Volumes

Tree harvesters often have built-in tracking systems that can be used to record detailed log data.

1. As the harvester limbs and bucks a tree, the gross volume of each log is recorded.
2. Volume tallies are allocated to each deck.

Pros:

- Provides gross volumes by piece.
- Provides a printed record.
- Site access or deck visibility unimportant.

Cons:

- Does not provide net volumes or species grade combinations.
- Requires records control management.
- Subject to equipment maintenance standards.
- Available only to operators with the necessary equipment.
- There is a tendency to overstate volumes.

Tips:
Establish a responsibility center for records control.
Conduct regular equipment accuracy checks.

Using Built in Scales: Truck and Helicopter

Timber is often forwarded off-highway by truck to convenient locations for later main line or on-highway transport. Heli-log operations keep detailed production records that include log data and weights per turn. This information will help provide an estimate.

1. Each forwarding turn is accompanied by a load description slip to the decking area and on each slip the empty and loaded weight is recorded as indicated on the scale.

2. A ratio, determined either from actual sampled loads weight scaled, or from an agreed upon ratio, is then applied to the total weights.

Pros:

- Can provide accurate estimates by species and grade from samples.
- Provides a written record.
- Site access or deck visibility unimportant.

Cons:

- Truck scales are suitable for estimating purposes only..
- Requires records control management.
- Subject to equipment maintenance standards.

Tips:

Use existing sample data to determine species grade combinations.

Establish a responsibility center for records control.

If built in scales are not effective, the average load per truck times the number of loads could be used.

Remote Scale Platforms

Similar to truck scale weights, this system can and does produce the official scale if sampling is performed on site.

1. Each forwarding truck is accompanied by a load description slip to the weight scaling area and normal weight scaling practice is followed.
2. Ratios are determined from sample scales and samples form part of the sample statistical file.

Pros:

- Pre scales the wood before decking.
- Eliminates most decking concerns.
- Site access or deck visibility unimportant to scale.
- Can be shared with other operators in the same area.

Cons:

- Too expensive to set up for low volumes.
- Requires precise records control management.
- Can be difficult to access for inspections and check scales.
- Large area usually required.

> Tips:
>
> Consider careful cost-benefit analysis and cost sharing with other operators in same area.

Other Technology

With the development of sophisticated electronic systems, other possibilities will become available. Technology such as scanners and digital photography may prove to be suitable in many cases.

Appendix A

FIELD SCALE WORKSHEET (Completed Example)

For: Consolidated Mini Multifibre (Canada) Inc.

Location: Beetlebrow Contact: Scale Site #842

Completion of Harvesting:):	April 1, 1999
Planned Haul (Haul to start by): and Haul Sequence:	June 15, 1999 143/10-1; CP123-a&b; 143/10-2&3; A22398
Planned End: (Haul complete):	July 31, 1999
Timber Marking (Decked wood):	10%, T.M. and "closed" painted on accessible sides
Timber Marking Method (on haul) :	Per Regs

Planning Phase:						Reconciliation Phase:				
Deck identifier: name, locations (Road names, CP, Block)	Cruise vol. by block	Predicted deck volumes	To Bill Y/N	Value Hi/Lo	Proposed Scale Method (P/W)	Field Scale Completion Date:	Field Scale Method Applied	Official scale date OR →	Field scale official?	Billing Reconciliation completed
Steepone 143/10-1	2 550	500	N	HI	W	N/A	N/A	99/06/17	NO	99/08/30
Steepone 143/10-2	10 100	1 000	Y	HI	W	99/05/10	Stacked	99/07/30	NO	99/08/30
Steepone 143/10-3	4 300	1 000	Y	HI	W	99/05/10	Stacked	99/07/30	NO	99/08/15
Quickdeath CP123-a	1 800	700	Y	HI	W	99/05/05	Sample	99/07/30	NO	99/08/15
Quickdeath CP123-b	8 400	500	Y	HI	W	99/05/06	Sample	99/07/30	NO	99/08/30
Kiwa main A22398	2 300	1 000	Y	LO	W	99/05/03	Cruise	N/A	YES	99/06/15
Total Predicted Deck Volumes:		4 700	Addenda: Wt scales submitted 99/08/03 Field scales submitted 99/05/20							

Contingency Plan for lost or destroyed timber:	Apply historic species/grade profile to field scale volumes and submit field scale as official scale on affected decks.
Contingency Plan for minor volumes left after haul:	Access sites and piece scale, or stacked scale if decked.
Contingency Plan for deterioration between field scale and official scale.	Grade all dead and dry as s/l and apply historical averages if available.
Prepared by:	MOF Approved by:
Notes:	

FIELD SCALE WORKSHEET

For: _____

Location: _____ Contact: _____

Completion of Harvesting:):	
Planned Haul (Haul to start by): and Haul Sequence:	
Planned End: (Haul complete):	
Timber Marking (Decked wood):	
Timber Marking Method (on haul) :	

Planning Phase:						Reconciliation Phase:				
Deck identifier: name, locations (Road names, CP, Block)	Cruise vol. by block	Predicted deck volumes	To Bill Y/N	Value Hi/Lo	Proposed Scale Method (P/W)	Field Scale Completion Date:	Field Scale Method Applied	Official scale date OR →	Field scale official?	Billing Reconciliation completed
Total Predicted Deck Volumes:			Addenda:							

Contingency Plan for lost or destroyed timber:	
Contingency Plan for minor volumes left after haul:	
Contingency Plan for deterioration between field scale and official scale.	
Prepared by:	MOF Approved by:
Notes:	

APPENDIX B

FIELD SCALE RATING WORK CHART

Group Definitions

- **Size**: are the decks small or large?
- **Access**: Is it possible or practical to get to the decks for viewing?
- **Lengths**: Random length, bucked to multiples, or all one length?
- **Composition**: Predominately one species grade or mixed?
- **View**: Is the deck viewable from all sides or is it obscured?
- **Value**: Is the predominate quality relatively high or relatively low?
- **Statistics**: What information is available on the species/grade/volume composition through cruise data, sample scale data, or other data from similar strata?

Instructions

1. In each group, highlight a condition for the deck(s).
2. Add the ratings for each method by selected condition.
3. Consider methods with highest ratings and chose a practical one.
4. Methods with higher ratings are preferred. Methods with a very high ratings may be considered for an official scale.
5. Although a given method may show a high rating, it may be impractical to apply. Choose the next lowest rated method and reconsider practicality.

Rating System

"-1" = negative effect (difficult to achieve with reasonable effort)

" 0 " = not applicable or neutral

" 1" = positive effect (can be achieved with reasonable effort)

FIELD SCALE RATING WORK CHART (COMPLETED EXAMPLE)

Group	Condition	Cruise-piece count	Cruise-area harvested.	Stacked-sampling	Stacked-pc. count	Stacked-Factor	Stacked-Bundles	Stacked-ocular	Mech.-harvesters	Mech-Truck Scales	Mech.-Remote scale	Mech-emerging technol.
Size	Small	1	0	-1	1	1	0	0	0	0	0	0
	Large	-1	0	1	0	0	0	0	0	0	0	0
Access	poor	-1	0	-1	-1	-1	-1	-1	0	0	0	0
	good	1	0	1	1	1	1	1	0	0	0	0
Lengths	Random	0	0	-1	-1	-1	0	0	0	0	1	0
	Bucked to rm.	0	0	1	1	1	0	1	1	0	1	0
Comp.	Uniform	0	0	1	1	1	0	1	1	1	1	0
	Diverse sp/gr	0	0	-1	-1	-1	0	-1	-1	0	1	0
View	Open	1	0	1	1	1	1	1	0	0	0	0
	Obscured	-1	0	-1	-1	0	1	0	0	0	0	0
Value	High	0	0	0	0	0	0	0	0	0	1	0
	Low	1	1	1	1	1	1	1	1	1	1	0
Stats	Minimal	-1	-1	0	-1	0	-1	0	-1	-1	0	0
	Thorough	1	1	0	1	1	1	1	1	1	1	0
	Rating	0	1	-1	-1	-1	1	0	0	1	4	0

FIELD SCALE RATING WORK CHART

Group	Condition	Cruise-piece count	Cruise- area harvested	Stacked-sampling	Stacked-pc. count	Stacked-Factor	Stacked-Bundles	Stacked-ocular	Mech-harvesters	Mech-Truck Scales	Mech-Remote scale	Mech-emerging technol.
Size	Small											
	Large											
Access	poor											
	good											
Lengths	Random											
	Bucked to m.											
Comp.	Uniform											
	Diverse sp/gr											
View	Open											
	Obscured											
Value	High											
	Low											
Stats	Minimal											
	Thorough											
	Rating											